CLAIMS

1. ~~A method for processing~~ An audio signal~~, wherein a frame of the audio signal comprises N frequency sub-bands, the method~~ processing method, comprising:

determining, according to an energy attribute value and a spectral attribute value of ~~a first subset~~ M sub-bands of ~~the~~ N sub-bands of ~~a current frame of the~~ an audio signal, whether to ~~adjust~~modify quantized energy envelopes of the M sub-bands ~~in the first subset~~, wherein the ~~first subset has M~~N sub-bands ~~and a second subset has~~further comprise K sub-bands, the ~~first subset~~M sub-bands and the ~~second subset~~K sub-bands have no overlap in frequency, wherein the largest frequency of the M sub-bands is lower than the lowest frequency of the K sub-bands, both M and K are positive integers, and N=M+K;

based on a determination that the quantized energy envelopes of the M sub-bands ~~in the first subset~~ need to be ~~adjusted, adjusting~~modified, modifying the quantized energy envelopes of the M sub-bands ~~in the first subset~~ individually to obtain ~~adjusted~~modified energy envelopes of the M sub-bands; and

~~based~~performing bit allocation on the ~~adjusted~~N sub-bands according to the modified energy envelopes of the M sub-bands ~~in the first subset~~ and energy envelope information of the K sub-bands ~~in the second subset, allocating encoding bits for the N sub-bands of the current frame, wherein each of the N sub-bands is either having encoding bits allocated or not having any encoding bits allocated~~.

2. The method according to claim 1, wherein the energy attribute value of ~~the first subset~~M-subbands is determined according to quantized energy envelopes of the N sub-bands.

3. The method according to claim 2, wherein the energy attribute value of the ~~first subset~~M sub-bands is determining by:

obtaining a sum of the quantized energy envelopes of the M sub-bands ~~in the first subset~~;

obtaining a sum of the quantized energy envelopes of the K sub-bands ~~in the second subset~~; and

calculating a ratio of the sum of the quantized energy envelopes of the M sub-bands to the sum of the quantized energy envelopes of the K sub-bands, wherein the ratio represents the energy attribute value of the ~~first subset~~M sub-bands.

4. The method according to ~~claim~~any one of claims 1-3, wherein the spectral attribute value of the ~~first subset~~M sub-bands is determined according to the quantized energy envelopes of the M sub-bands ~~in the first subset~~.

5. The method according to claim 4, wherein the spectral attribute value of the ~~first subset~~M sub-bands is determined by:

obtaining a sum of the quantized energy envelopes of the M sub-bands ~~in the first subset~~; and

calculating a ratio of a quantized energy envelope of a first sub-band ~~in~~within the ~~first subset~~M sub-bands to the sum of the quantized energy envelopes of the M sub-bands ~~in the first subset~~, wherein the ratio represents the spectral attribute value of the ~~first subset~~M sub-bands, and wherein the quantized energy envelope of the first sub-band is the largest among the M sub-bands ~~in the first subset~~.

6. The method according to ~~claim~~any one of claims 1-5, wherein when the energy attribute value of the ~~first subset~~M sub-bands falls within a first range, and the spectral attribute value of the ~~first subset~~M sub-bands falls within a second range, determining to adjust the quantized energy envelopes of the M sub-bands ~~in the first subset~~.

7. The method according to claim 6, wherein the ~~energy attribute value of the first subset is represented by a ratio of a sum of the quantized energy envelopes of the M sub-bands in the first subset to a sum of the quantized energy envelopes of the K sub-bands in the second subset, and the~~ first range is [1/6, 2/3].

8. The method according to claim 6 or 7, wherein when an encoded bandwidth of the audio signal is 0 to 4 KHz, the ~~spectral attribute value of the first subset is represented by a ratio of an quantized energy envelope of a first sub-band in the first subset to a sum of the quantized energy envelopes of the M sub-bands in the first subset, wherein the quantized energy envelope of the first sub-band is the largest among the M sub-bands in the first subset, and the second range is [~~second range is $[\frac{1}{0.575 * M}, \infty)$.

9. The method according to claim 6 or 7, wherein when an encoded bandwidth of the audio signal is 0 to 8 KHz, the ~~spectral attribute value of the first subset is represented by a ratio of an quantized energy envelope of a first sub-band in the first subset to a sum of the quantized energy envelopes of the M sub-bands in the first subset, wherein the quantized energy envelope of the first sub-band is the largest among the M sub-bands in the first subset, and the second range is [~~second range is $[\frac{1}{0.5*M}, \infty)$.

10. The method according to ~~claim~~any one of claims 1-9, wherein ~~adjusting~~the modifying the quantized energy envelopes of the M sub-bands ~~in the first subset~~ individually to obtain ~~adjusted~~modified energy envelopes of the M sub-bands comprises:

determining, according to a sum of the quantized energy envelopes of the M sub-bands ~~in the first subset~~ and a quantized energy envelope of a first sub-band ~~in~~within the ~~first subset, an adjustment~~M sub-bands, a modifying factor for each of the M sub-bands ~~in the first subset~~, wherein the quantized energy envelope of the first sub-band is the largest among the M sub-bands ~~in the first subset~~; and

~~adjusting~~modifying the quantized energy envelopes of the M sub-bands ~~in the first subset~~ individually using the ~~adjustment~~modifying factors, to obtain the ~~adjusted~~modified energy envelopes of the M sub-bands ~~in the first subset~~.

11. The method according to ~~claim~~any one of claims 1-10, wherein ~~an adjusted~~a modified energy envelope of each sub-band ~~in~~of the ~~first subset~~M sub-bands is greater than a quantized energy envelope of the same sub-band.

12. The method according to ~~claim~~any one of claims 1-11, wherein the energy envelope information of the K sub-bands ~~in the second subset~~ comprises energy envelopes of the K sub-bands ~~in the second subset, and,~~ wherein an energy envelope of a sub-band of the ~~second subset~~ K sub-bands is either a quantized energy envelope or an energy envelope that is obtained by ~~adjusting~~modifying the quantized energy envelope.

13. ~~A device for~~An audio signal processing ~~an audio signal, wherein a frame of the audio signal comprises N frequency sub-bands, the device~~device, comprising:

a ~~memory for storing program instructions; and~~

~~a processor operatively coupled to the memory,~~

~~wherein, by executing the program instructions, the processor is~~ determining unit, configured to ~~:~~

determine, according to an energy attribute value and a spectral attribute value of ~~a first subset of the N sub-bands of a current frame of the audio signal, whether to adjust quantized energy envelopes of the~~M sub-bands ~~in the first subset, wherein the first subset has M~~ of N sub-bands ~~and a second subset has K sub-bands, the first subset and the second subset~~ of an audio signal, whether to modify quantized energy envelopes of the M sub-bands, wherein the N sub-bands further comprise K sub-bands, the M sub-bands and the K sub-bands have no overlap in frequency, wherein the largest frequency of the M sub-bands is lower than the lowest frequency of the K sub-bands, both M and K are positive integers, and N=M+K;

a modification unit, configured to based on a determination that the quantized energy envelopes of the M sub-bands ~~in the first subset~~ need to be ~~adjusted, adjust~~modified, modify the quantized energy envelopes of the M sub-bands ~~in the first subset~~ individually to obtain ~~adjusted~~modified energy envelopes of the M sub-bands; and

~~based~~an allocation unit, configured to performing bit allocation on the ~~adjusted~~N sub-bands according to the modified energy envelopes of the M sub-bands ~~in the first subset~~ and energy envelope information of the K sub-bands ~~in the second subset, allocate encoding bits for the N sub-bands of the current frame, wherein each of the N sub-bands is either having encoding bits allocated or not having any encoding bits allocated~~.

14. The device according to claim 13, wherein the energy attribute value of ~~the first subset~~M-subbands is determined according to quantized energy envelopes of the N sub-bands.

15. The device according to claim 14, wherein in ~~determining~~determine the energy attribute value of the ~~first subset~~M sub-bands, the ~~processor, by executing the program instructions,~~determining unit is configured to:

obtain a sum of the quantized energy envelopes of the M sub-bands ~~in the first subset~~;

obtain a sum of the quantized energy envelopes of the K sub-bands ~~in the second subset~~; and

calculate a ratio of the sum of the quantized energy envelopes of the M sub-bands to the

sum of the quantized energy envelopes of the K sub-bands, wherein the ratio represents the energy attribute value of the ~~in the first subset~~M sub-bands.

16. The device according to ~~claim~~any one of claims 13-15, wherein the spectral attribute value of the ~~first subset~~M sub-bands is determined according to the quantized energy envelopes of the M sub-bands ~~in the first subset~~.

17. The device according to claim 16, wherein in ~~determining~~determine the spectral attribute value of the ~~first subset, the processor, by executing the program instructions,~~M sub-bands, the determining unit is configured to:

obtain a sum of the quantized energy envelopes of the M sub-bands ~~in the first subset~~; and

calculate a ratio of a quantized energy envelope of a first sub-band ~~in~~within the ~~first subset~~M sub-bands to the sum of the quantized energy envelopes of the M sub-bands ~~in the first subset~~, wherein the ratio represents the spectral attribute value of the ~~first subset~~M sub-bands, and wherein the quantized energy envelope of the first sub-band is the largest among the M sub-bands ~~in the first subset~~.

18. The device according to ~~claim~~any one of claims 13-17, wherein when the energy attribute value of the ~~first subset~~M sub-bands falls within a first range, and the spectral attribute value of the ~~first subset~~M sub-bands falls within a second range, the ~~processor determines~~determining unit is configured to determine to adjust the quantized energy envelopes of the M sub-bands ~~in the first subset~~.

19. The device according to claim 18, wherein the ~~energy attribute value of the first subset is represented by a ratio of a sum of the quantized energy envelopes of the M sub-bands in the first subset to a sum of the quantized energy envelopes of the K sub-bands in the second subset, and the~~ first range is [1/6, 2/3].

20. The device according to claim 18 or 19, wherein when an encoded bandwidth of the audio signal is 0 to 4 KHz, the ~~spectral attribute value of the first subset is represented by a ratio of an quantized energy envelope of a first sub-band in the first subset to a sum of the quantized energy envelopes of the M sub-bands in the first subset, wherein the quantized~~

~~energy envelope of the first sub-band is the largest among the M sub-bands in the first subset, and the second range is [~~second range is $[\frac{1}{0.575*M},\infty)$.

21. The device according to claim 18 or 19, wherein when an encoded bandwidth of the audio signal is 0 to 8 KHz, the ~~spectral attribute value of the first subset is represented by a ratio of an quantized energy envelope of a first sub-band in the first subset to a sum of the quantized energy envelopes of the M sub-bands in the first subset, wherein the quantized energy envelope of the first sub-band is the largest among the M sub-bands in the first subset, and the second range is [~~second range is $[\frac{1}{0.5*M},\ \infty)$.

22. The device according to ~~claim~~any one of claims 13-21, wherein ~~in adjusting~~ the ~~quantized energy envelopes of the M sub-bands in the first subset individually to obtain adjusted energy envelopes of the M sub-bands, the processor, by executing the program instructions,~~modification unit is configured to:

determine, according to a sum of the quantized energy envelopes of the M sub-bands ~~in the first subset~~ and a quantized energy envelope of a first sub-band ~~in~~within the ~~first subset, an adjustment~~M sub-bands, a modifying factor for each of the M sub-bands ~~in the first subset~~, wherein the quantized energy envelope of the first sub-band is the largest among the M sub-bands ~~in the first subset~~; and

~~adjust~~modify the quantized energy envelopes of the M sub-bands ~~in the first subset~~ individually using the ~~adjustment~~modifying factors, to obtain the ~~adjusted~~modified energy envelopes of the M sub-bands ~~in the first subset~~.

23. The device according to ~~claim~~any one of claims 13-22, wherein ~~an adjusted~~a modified energy envelope of each sub-band ~~in~~of the ~~first subset~~M sub-bands is greater than a quantized energy envelope of the same sub-band.

24. The device according to ~~claim~~any one of claims 13-23, wherein the energy envelope information of the K sub-bands ~~in the second subset~~ comprises energy ~~envelope~~ envelopes of the K sub-bands, wherein an energy envelope of a sub-band of the K sub-bands ~~in the~~

~~second subset, and wherein an energy envelope of a sub-band of the second subset~~ is either a quantized energy envelope or an energy envelope that is obtained by ~~adjusting~~modifying the quantized energy envelope.

25. A computer-readable storage medium having a program recorded thereon; where the program makes the computer execute method of any of claims 1 to 12.

26. A computer program configured to cause a computer to execute method of any of claims 1 to 12.